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Anodonta Napoensis.—Testa lævi, oblongo-elliptica, subcompressa, valde inæquilaterali, antice et postice rotundata; valvulis subcrassis; natibus prominulis; epidermide tenebroso-fusca, encarpiformi, flexuosa, obsolete radiata; margarita pallido-viridi, non iridescente.

Hab.—River Napo, Equador, S. Am., Prof. Orton.

Descriptions of UNIONIDÆ from the Lower Cretaceous Formation of New Jersey.

BY ISAAC LEA.

Prof. Cope very kindly placed in my hands the specimens of *Unionidæ* which he collected in a bed of *bluish clay*, now first observed to contain them, about six miles north-east of Camden, N. J. This bed is subordinate to the *Green Sand*, so long known to our geologists as belonging to that portion of the Cretaceous group which furnished so many interesting organic remains within the last forty years, particularly the *Hadrosaurus Foulkii*, Leidy, and the *Lælaps aquilunguis*, found by Prof. Cope. The same member of the *Green Sand Formation* has been very productive also of marine *mollusca*, some of which I described in our Proceedings from the beds near Haddonfield, N. J. But, as observed above, no *fresh water* remains had been found in these cretaceous beds there, and the unexpected development of these *Unionidæ* by Prof. Cope, it is hoped, may lead to other and more extensive results.

These interesting beds in New Jersey have only yet had a very slight development. They will, no doubt, continue to yield their natural treasures to the industrious investigator for many years. The late Prof. Vanuxem, as early as 1818, while examining the Paris basin, was convinced that these New Jersey beds had their equivalent in the *Green Sand* of Europe; and subsequently, in 1828, his notes were published in the Journal of the Academy, where he gave a table of their "relative geological position."

Prof. Cope procured nearly forty specimens of *Unionidæ*, and these are composed of ten species, viz.: eight *Uniones* and two *Anadontæ*. These consist almost altogether of casts, but the forms are well preserved, and in some specimens the inner layers of the nacre are remaining in fragments. These fragments, submitted to the microscope, exhibit the imbricated structure as developed by Prof. Carpenter in the *Unionidæ*, but I could not detect any of that portion of the outer structure of the nacre where the base membrane is deposited in the peculiar cellular structure described and figured in his work. The impress of the muscular cicatrices is visible in many of the specimens. These cicatrices being placed in their usual positions, shewing even the dorsal and palleal scars. While all the massive structure of the cardinal and lateral teeth have been decomposed and carried off, their impress in the clay remains perfect, showing the same forms and striæ which are found in the massive cardinal and lamellar teeth of our western species.

As there are no characters of the shell itself left in any one of the specimens, to designate specific differences, either by form of teeth, color of nacre, or epidermal rays, it remains only to take the outline, transverse diameters, and general curves, to group these specimens. In so doing, I have made these groups conform to the most known species, and named them accordingly. Among these specimens I have noticed none which have nodules or folds, while there is a general resemblance in size and form to those now inhabiting the rivers of the Ohio basin.

As the bed in which these fresh-water shells are found lies below the well-known deposits of "green sand or marl beds," it becomes a very interesting question as to its relations to these superimposed beds. Further investigation can alone give us the data to settle this point. In finding these fresh-water *molluscs* here, we are naturally brought to consider how far they may have relation to the products of those deposits in Europe, where the same genera of fresh-water shells have been found abundant; I mean of course the *Wealden* of England, in which the distinguished geologist Dr. Mantell had worked so successfully, and in which he found the *Iguanodon Mantelli*, a gigantic terrestrial reptile, and other animals, together with many fresh-water *molluscs*, particularly a large number of *Unionidæ*, analogous in form to these now so happily found by Prof. Cope in this bed below the *Green Sand.*[*]

I ought to state, in connection with this subject, that Dr. Hayden published with Mr. Meek, some ten years since, observations made by the former regarding the estuary and fresh-water deposits near the mouth of the Judith River, where Dr. Hayden found *Uniones*, *Paludinæ*, &c. These geologists, considering it the lowest, have called this number one. They say in their paper, published in our Proceedings May, 1857, that "the estuary and fresh-water deposits at the mouth of the Judith River are probably in a parallel with the lowest bed of the great Lignite basin, though some portions of them may be somewhat older."

UNIO NASUTOIDES.[†]—Shell smooth, very wide, compressed, very inequilateral, biangular behind, rounded before; beaks slightly raised, nearly terminal; cardinal teeth short and striate; lateral teeth long, and nearly straight.

Length 1·5 inches, breadth 4·6 inches.

Remarks.—This species is very nearly the same in outline with the well-known *nasutus*, Say, but it is more acute at the posterior margin, in which character it is more nearly allied to *Fisherianus* (nobis).

UNIO RADIATOIDES.—Shell smooth, regularly elliptical, compressed, inequilateral, subangular behind and rounded before; beaks slightly raised, submedial; cardinal teeth large; lateral teeth large, rather long and lamellar.

Length 2·4 inches, breadth 4·3 inches.

Remarks.—Some of the large and compressed varieties of *radiatus*, Lam., are nearly of the same outline with this species, and the beaks are nearly in the same position. It is evidently a species of thickness and weight.

UNIO SUBROTUNDOIDES.—Shell smooth, subrotund, very much compressed, very inequilateral, rounded behind and before; beaks slightly raised, nearly terminal; cardinal teeth apparently small; lateral teeth long, lamellar and arched.

Length 2·6, breadth 3·4 inches.

Remarks.—Very nearly of the same outline with *subrotundus* nobis, but not so high in the beaks. The lateral teeth seem to be unusually long and curved.

UNIO CARRIOSOIDES.—Shell smooth, broadly elliptical, somewhat inflated, obtusely angular behind, rounded before; beaks somewhat raised, removed from medial; cardinal teeth ——— ; lateral teeth long and slightly curved.

Length 2·5, breadth 4·8 inches.

Remarks.—This is evidently a very regularly formed species, the curves being gentle and pleasing. It resembles in outline some of the more transverse large males of *carriosus*, Say.

UNIO HUMEROSOIDES.—Shell smooth, ovately oblong, very much compressed, rounded behind and before; beaks slightly raised, removed from medial; cardinal teeth large and compressed; lateral teeth rather long and slightly curved.

Length 2·6, breadth 4·2 inches.

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[*] While in London in 1852, my friend Dr. Mantell consulted me in relation to these *Unionidæ* from the Wealden, of which he had several hundred specimens, with the intention of publishing them. For this purpose I grouped the whole of this fine collection, and assimilated them to those of our existing western species. Owing to severe illness, from which he never recovered, Dr Mantell did not publish these shells, and his collection was dispersed by a public sale. On my return from the continent to London, fifteen months afterward, I found in the cabinet of the late distinguished geologist, Mr. Sharp, a portion of them, which he had purchased, and which still had the labels which I had written for Dr. Mantell. I am not aware of any of these having been published.

[†] These descriptions are of course imperfect, being little more than from casts. Specimens of all the species are deposited in the cabinet of the Academy of Natural Sciences.

Remarks.—A rather unusual outline, and more like some South American species than our own, except *humerosus* (nobis), which it is closely allied to. The exterior is very much and coarsely striate.

Unio Roanokoides.—Shell smooth, very wide and slightly curved at basal margin, compressed towards the beaks, rounded before and behind; beaks slightly raised, well advanced towards the anterior margin; cardinal teeth rather large, very much striate; lateral teeth very long, lamellar and slightly curved.

Length 2·6, breadth 4·8 inches.

Remarks.—The form of this species is very unusual, and it is nearest in outline to *Roanokensis* and *macer* (nobis). A portion of the nacre remains on the specimen, but there is no appearance of rays on this or any other of these specimens. The anterior portion is remarkably compressed for a *Unio;* this character somewhat applies to others which accompanied it.

Unio ligamentinoides.—Shell smooth, elliptical, very much compressed, very inequilateral, angular behind and rounded before; beaks slightly raised; cardinal teeth compressed: lateral long, lamellar and curved.

Length 2·3, breadth 3·5 inches.

Remarks —The outline and general appearance of this shell is nearly that of a compressed male *ligamentinus*, Lam., but rather more arched above. The curves are regular, and no doubt that in a perfect state it must have been attractive as its prototype now existing is.

Unio alatoides.—Shell alate, smooth, subelliptical, very much compressed, inequilateral, rounded before and behind; beaks raised; cardinal teeth oblique and compressed; lateral teeth long, large, lamellar and very slightly curved.

Length 2·9, breadth 4·2 inches.

Remarks.—A single specimen only is before me, and this by no means perfect. It is very closely allied to *alatus*, Say. The anterior dorsal portion of one valve is gone, and that of the other valve is crushed, but the posterior portion is in a very good state, showing a perfect and deep mould of the large, regular, lamellar lateral tooth, over which the posterior dorsal portion of the disk extends into a well-defined wing, which was connate above, but not extending so high as in *alatus*.

Anodonta grandioides.—Shell smooth, elliptical, very much inflated, ventricose, obtusely angular behind, obliquely rounded before; beaks submedial, flattened at the tips, but very much inflated on the umbos.

Length 3·3, breadth 4·9 inches.

Remarks.—This species is more like *grandis*, Say, than any other of our western *Anodontæ*. It is about the same size, and of very nearly the same outline. Both the valves are present, and in their natural relevant positions. The umbos are much inflated, but not so much as the other species (*corpulentoides*) herein described.

Anodonta corpulentoides.—Shell smooth, rotundo-elliptical, exceedingly inflated, very ventricose, obtusely angular behind, rounded before; beaks submedial, flattened at the tips, but excessively inflated on the umbos.

Length 3·6, breadth 6·5 inches.

Remarks.—This species is so nearly like *corpulenta*, Cooper, that I have no hesitation to consider it nearest in outline and form to that remarkable species, described by the late Judge William Cooper, and which inhabits the Lake of the Woods, and other north-western waters. There is no mistaking the peculiar great enlargement of the umbos of this species being analogous to *corpulenta.* There are two imperfect specimens before me, but the larger one has the anterior half of the right valve and posterior half of the left valve, which enables me to make a nearly correct description and measurement.